CHAPTER 2
PREPARATION OF M1A2
LESSON PLAN 2

METHOD:

Conference, demonstration, and practical exercise

TIME ALLOTTED:

1.5 hours

COURSE PRESENTED TO:

a. Tank crews
b. Instructors
c. TSC personnel

TOOLS, EQUIPMENT, AND MATERIALS:

See Appendix A

PERSONNEL:

a. Primary instructor
b. Assistant instructor

INSTRUCTIONAL AIDS:

a. Overhead projector
b. Viewgraphs (Appendix E)

REFERENCES:

a. TM 9-6920-709-12&P-1-2, Chapter 2
b. TM 9-2350-288-10-1/2
c. ST 17-12-1-A2, Chapter 4

APPENDICES:

Appendix A. Tools, Equipment, and Materials
Appendix B. Safety
Appendix C. Automatic and Manual Inputs for CCP
Appendix D. Test Administration Guide
Appendix E. Viewgraphs

2-1. INTRODUCTION. (5 minutes)

Note. Show Slide 1.

a. **Reason.** TWGSS provides tank crews with a means to conduct precision gunnery training using their assigned tank. To use TWGSS to its full potential, you must properly prepare the tank for TWGSS training.

Note. Show Slide 2.

b. **Training Objective.** Given an operational M1A2 series tank with BII, LRF eye-safe laser (ELF) filter installed, and an M27A1 muzzle boresight device, you will perform the following tasks to prepare the tank for TWGSS training:

(1) Conduct prepare-to-fire checks and services IAW TM 9-2350-255-10.
(2) Boresight tank IAW ST 17-12-1-A2, Chapter 4.
(3) Update automatic and manual inputs IAW TM 9-6920-709-12&P-1-2, Chapter 2.
(4) Prepare tank-specific equipment IAW TM 9-6920-709-12&P-1-2, Chapter 2.

c. **Procedure.** During this block of instruction we will cover how to prepare the tank for TWGSS training. You will have an assistant (small group) instructor for the practical exercise portion of this class. You will follow the instructions as found in the appropriate FMs and TMs to prepare the host tank for TWGSS training. After completion of training, you will be evaluated on your ability to prepare the tank for TWGSS training.

2-2. CONFERENCE/DEMONSTRATION/PRACTICAL EXERCISE. (65 minutes)

Notes.
1. The primary instructor will release the student crews to their assigned assistant (small group) instructors for the practical exercise portion of this lesson.
2. Prior to students' arrival, ensure that an assistant instructor is assigned to each training station.
3. Direct students to their appropriate training station.
4. Each assistant instructor is to conduct a safety briefing for his small group IAW Appendix B.
5. Whenever possible, have the students serve as demonstrators during small group instruction. Have one student read the procedures while another student performs the task. To ensure all students get equal hands-on time, rotate the reading and performance responsibilities.
6. The assistant instructor discusses and clarifies the procedures as required and reinforces the training objective.

2-2. CONFERENCE/DEMONSTRATION/PRACTICAL EXERCISE (Con't).

Warning. Have the crew verify that the LRF ELF has been installed.

a. **Conduct Prepare-to-Fire Checks and Services.** Work as a crew to perform the prepare-to-fire checks and services which apply to the FCS using TM 9-2350-288-10.

Note. Inform the crews that improper boresighting of tank will result in poor training results.

b. **Boresight FCS.** Boresight the FCS using procedures outlined in ST 17-12-1-A2, Chapter 4.

Notes. 1. Show Slides 3, 4, and 5.
2. See Automatic and Manual Inputs for CCP, Appendix C.

c. **Update Automatic and Manual Inputs.** Update the automatic and manual input values in the gunner's control and display panel (GCDP) for main gun and coax.

Notes. 1. Refer to Appendix C for automatic and manual input values.
2. Show Slide 6.

d. **Prepare Tank-Specific Equipment.**

(1) Use manual turret and gun controls to position main gun over right side number two road wheel.
(2) Secure main gun elevation lock. Engage turret traverse lock.
(3) Set gun/turret drive switch to MANUAL position.
(4) Place utility power switch in OFF position.
(5) Place vehicle master power switch and turret power switch in OFF position.
(6) Remove main gun muzzle plug. Inspect and clean interior of muzzle.
(7) Inspect and clean GAS optical port.
(8) Remove loader's periscope from loader's hatch to allow cables to enter turret.

Warning. Ensure that main gun is locked to turret roof, turret traverse lock is engaged, and GTD switch is set to MANUAL prior to walking around or under gun.

(8) Remove FCEU protective guard under the main gun to allow access to FCEU area. Use 9/16 in. socket.
(9) Adjust load plan to allow for external mounting of target system components, if needed.

2-3. TEST. (15 minutes/test)

Note. See Appendix D.

2-4. FINAL REVIEW. (5 minutes)

a. **Student Questions.**

Note. Show Slide 7.

b. **Summary of Main Teaching Points.**

(1) Pre/post firing checks
(2) Boresight FCS
(3) Update automatic and manual inputs for GCDP
(4) Prepare tank-specific equipment

Note. Show Slide 8.

c. **Closing Statement.** In order to get the desired training result from the TWGSS equipment, you first must be able to properly prepare the tank for TWGSS training.

APPENDIX A
TO LESSON PLAN 2

PREPARATION OF M1A2

TOOLS, EQUIPMENT, AND MATERIALS

Listed equipment is one per tank crew, except as noted.

1. M1A2 tank with BII
2. LRF eye-safe laser filter (ELF)(installed)
3. M27A1 muzzle boresight device
4. Hoffman device, if used
5. TM 9-6920-709-12&P-1-2
6. TM 9-2350-288-10-1 and TM 9-2350-288-10-2
7. ST 17-12-1-A2
8. Boresight panel
9. Training area with a minimum of 1200 m of maneuver space
10. Appendix C (one copy per student)

APPENDIX B
TO LESSON PLAN 2

PREPARATION OF M1A2

SAFETY

Listed general safety regulations are to be strictly enforced during the performance of this lesson.

1. Mount and dismount tank over left front fender.
2. Maintain 3 points of contact while on top of tank.
3. No smoking within 50 m of tank.
4. Do not go over or under gun tube.
5. Ensure main gun is locked to turret roof and turret traverse lock is engaged prior to working under the main gun.
6. Ensure gun/turret/drive (GTD) switch is set to MANUAL position during installation/removal, alignment, troubleshooting, and before leaving turret.
7. Ensure LRF has eye-safe laser filter (ELF) installed and LRF is set to SAFE.

APPENDIX C
TO LESSON PLAN 2

PREPARATION OF M1A2

AUTOMATIC AND MANUAL INPUTS FOR GCDP

C-1. MANUAL INPUTS AND COMPUTER CORRECTIONS.

a. The following list of manual inputs and computer corrections must to be entered into the GCDP before training with TWGSS.

b. **Manual Inputs for GCDP.**

Note. These settings are based on firing table data. If current data was unavailable in combat, the crew would input these standard values.

AMMUNITION TEMPERATURE:	70° F
BAROMETRIC PRESSURE:	29.92 in. of Mercury
AIR TEMPERATURE:	59° F

c. **Automatic Inputs for GCDP.**

Note. All automatic inputs are left in operation. Only Crosswind needs to be disabled.

CROSSWIND SENSOR:	Set to 0.0 and select MANUAL mode
CANT SENSOR:	Set to AUTO position
LEAD SENSOR:	Set to ON position
RANGE:	Leave in normal operation
PITCH/ROLL:	Set to ON position
HULL/TURRET (H/T) SENSOR:	Set to ON position
HULL/TURRET ALIGNMENT:	Verify alignment

C-2. AMMUNITION SUBDESIGNATION AND COMPUTER CORRECTION FACTORS FOR CCP.

a. **General.** The listed ammunition subdesignations and computer correction factors are for combat ammunition. These settings must be entered into the GCDP before training with TWGSS.

C-2. AMMUNITION SUBDESIGNATION AND COMPUTER CORRECTION FACTORS FOR CCP (Con't).

Notes. 1. To enable the coax to hit, the same boresight values must be input for coax as input for main gun.
2. Normally the coax is individually zeroed. Individual coax zeroing cannot be done with TWGSS; therefore, set the values to 0.0 for both elevation and azimuth.

b. **M1A2.**

AMMUNITION	SUBDES	AZIMUTH	ELEVATION
HEAT-MP-T	M830	-0.25 Left	+0.37 Down
SABOT	M829A1	0.00	-0.45 Up
COAX M240	M240	0.0	0.0

APPENDIX D
TO LESSON PLAN 2

PREPARATION OF M1A2

TEST ADMINISTRATION GUIDE

D-1. TASK.

Administer test, *Input Computer Data for TWGSS Training.*

D-2. CONDITIONS.

Given a fully operational M1A2 tank with prepare-to-fire checks and boresighting completed.

D-3. STANDARDS.

The crewman will perform the following within 10 minutes:

a. Update manual inputs
b. Update automatic inputs
c. Input ammunition subdesignation and CCFs

D-4. PERSONNEL, EQUIPMENT, AND MATERIAL REQUIRED.

a. Evaluator (one per test station)
b. M1A2 tank with BII (one per evaluator)
c. TM 9-2350-288-10-1/2 (one set per test station)
d. TM 9-6920-709-12&P-1-2 (one copy per test station)
e. Appendix C, Automatic and Manual Inputs for GCDP (one copy per test station)
f. Scoring checklist of Appendix D (one copy for each crewman tested)

D-5. TEST PLANNING TIME.

Administrative time:	5 minutes
Test time:	10 minutes
TOTAL TIME (per crewman):	15 minutes

D-6. OTHER INFORMATION.

Before the crewman arrives, the evaluator will:

a. Set up the equipment and materials at the test station
b. Check tank for operation
c. Ensure TM 9-2350-288-10-1/2 is available
d. Ensure TM 9-6920-709-12&P-1-2 is available
e. Ensure Appendix C is available for the student's use
f. Have scoring checklist ready for crewman to be tested
g. Enter original values into GCDP

D-7. INSTRUCTIONS TO STUDENT.

"The purpose of this test is to determine your ability to properly input TWGSS-specific data into the Fire Control System (FCS) of the host tank. You will have 10 minutes to complete all steps. You must complete each step before beginning the next step. Your time will start when I announce 'BEGIN' and end when you announce 'FINISHED'. You may use your student handout during the test.

"Do you understand the requirements of this test?" (Answer questions)
"You may begin." (Start time)

INPUT COMPUTER DATA FOR TWGSS TRAINING

Scoring Checklist

NAME _____ UNIT _____

GRADE _____ DUTY POSITION _____

	GO	NO GO
1. Update manual inputs for TWGSS training	_____	_____
a. Entered 70° for ammunition temperature	_____	_____
b. Entered 29.92 for barometric pressure	_____	_____
c. Entered 59° for air temperature	_____	_____
2. Update automatic inputs for TWGSS training		
a. CROSSWIND sensor to 0.0 and MANUAL selected	_____	_____
b. CANT sensor to AUTO position	_____	_____
c. LEAD sensor to ON position	_____	_____
d. Left RANGE sensor in normal operation	_____	_____
e. PITCH/ROLL to ON position	_____	_____
f. HULL/TURRET (H/T) sensor to ON position	_____	_____
g. HULL/TURRET alignment verified OK.	_____	_____
3. Input ammunition subdes and CCFs for TWGSS training		
a. Input HEAT M830 subdes and verify CCF	_____	_____
b. Input SABOT M829A1 subdes and verify CCF	_____	_____
c. Input COAX boresight values (equal to main gun values)	_____	_____
d. Input coax zeroing data	_____	_____

	GO	NO GO	INITIALS
Soldier satisfactorily completed all requirements	_____	_____	_____

EVALUATOR _____

DATE TESTED _____

REMARKS _____

APPENDIX E
TO LESSON PLAN 2

PREPARATION OF M1A2

VIEWGRAPHS